SOILutions

VOL 3, NO 1 SPRING 92

Published Quarterly by Plant Industry Division's SOILS BRANCH

NUTRIENT REQUIREMENTS OF PULSE CROPS - PART II

Ross H. McKenzie, *Soil Fertility Specialist*
Len Kryzanowski, *Crop Nutrition Agronomist*

Soil fertility is a key management factor in pulse crop production. In the last issue of SOILutions we discussed nitrogen and phosphorus requirements of field peas, lentils and fababeans. In this issue we will look at potassium (K), sulphur (S) and micronutrients.

Potassium: Pulse crops have a high potassium requirement, using nearly as much potassium as nitrogen. However, only 20-25% of the plant K ends up in the seed and is removed with the crop. The remaining K in the leaves and stems is returned to the soil where it is available for the next crop.

Existing fertilizer recommendations (Table 1) suggest that pulse crops grown on soils testing less than 200 lb/ac will respond to potash. Alberta soil usually contain from 400 to a 1000 lb/ac of the plant available K^+ in the 0-6 inch depth. As a result, K levels are generally not limiting. Deficiencies are more likely in central and eastern Alberta than elsewhere in the province.

In cereal production, K fertilizers are more efficient when seed-placed or banded. With pulse crops,even small amounts of seed placed potassium can reduce germination and emergence. Therefore, place your potassium away from the seed by banding or broadcasting.

Continued Page 2

SOIL COMPACTION in ALBERTA?

Grant M. Gillund
Regional Soils Specialist
Vermilion

When the post pounder splits half the posts rather than driving them in the ground you begin to suspect something is wrong down there. Similarly, when the soil is so hard the cultivator won't stay in the ground, you know you have a soil compaction problem - right?

Not necessarily, let's not confuse high soil strength with soil compaction. Many of our soils can become extremely hard when dry, but that doesn't mean they are compacted. The high soil strength is a result not of mechanical compaction, but of the strong binding forces exerted on the soil particles by the microscopic water films. When moistened, soil strength decreases in these soils.

Compacted soils also have high soil strength but for a different reason. A compacted soil resists penetration because it is more dense. The soil particles have been compressed together and therefore have less room to move or shift. This presents a barrier to penetration even when the soil is moist.

The real question is not are soils hard but are they compacted and if so is this compaction restricting crop growth? I say yes, but with qualifications. The farm land in Alberta definitely shows signs of compaction, but only in a limited number of situations can compaction be directly related to reduced crop productivity.

Continued Page 6

Alberta Agriculture

Table 1. Potassium recommendations for pulse crops used by Alberta Agricultural Soil andAnimal Nutrition Laboratory based on a 1M ammonium acetate extractant.

Soil Test Level	K2O Recommendation (lb/ac)						
K(lb/ac)		Dark	Thin		Gray	Peace	
0-6	Brown	Brown	Black	Black	Wooded	River	Irrigated
>200	0	0	0	0	0	0	0
150-200	20	25	25	30	30	30	40
100-150	55	60	60	65	65	65	70
50-100	90	95	95	100	100	100	110
<50	110	115	115	120	120	120	125

Sulphur: Pulse crops have a higher requirement for sulphur than cereal crops. Fortunately sulphur levels in most soils in Alberta are usually adequate for crop growth. The exceptions are the Gray Luvisolic (gray wooded) and some of the Dark Gray and Eluviated Black soils.

Much of the sulphur in top soil (200 to 600 lb/ac) is contained in the organic matter. The activity of microorganisms slowly transforms organic-S to the plant available sulphate form (SO_4^{2-}). Some soils test low for sulphur in the 0-6 in depth, but contain plant available S as gypsum (calcium sulphate) in the subsurface horizons. In order to get a complete picture of available sulphur levels, you should sample the 0-6, 6-12 and 12-24 inch depths separately. This deep sampling to examine the sulphur profile need not be done every year. Every 3-4 years is probably adequate.

Irrigation water also contributes sulphur to a crop. Although amounts vary with time and place, approximately 30 lb/ac plant available S is added to the soil with 12 inches of irrigation water.

Like nitrogen, sulphur deficiency causes chlorosis (yellowing) of the leaves, but unlike nitrogen it is the younger rather than the older leaves which are first affected. Gradually the yellowing progresses to all leaves. In extreme cases, leaves are poorly developed, cupped, and have a purple color on the back. Flowers may be paler than normal, and flowering is delayed and prolonged. Pods form slowly, are small, and contain shrunken or shrivelled seeds. Overall maturity is generally delayed.

If sulphur deficiency symptoms are noticeable, then pulse crops are severely lacking in sulphur. On fields marginally deficient in sulphur, pulse crops may not show obvious visual deficiency symptoms, but yields can be seriously reduced. In these cases a soil test is useful and reliable tool for determining sulphur fertilizer requirements. Table 2 can be used as a guide in interpreting your soil test and deciding on fertilizer rates.

Table 2. Sulphur recommendations for pulse crops used by Alberta Agricultural Soil and Animal Nutrition Laboratory based on a 0.01M calcium chloride extractant.

Soil Test Level	Sulphur Recommendation (lb/ac)						
S(lb/ac)		Dark	Thin		Gray	Peace	
0-24 in depth	Brown	Brown	Black	Black	Wooded	River	Irrigated
>20	0	0	0	0	0	0	0
20	5	5	5	5	5	5	10
15	10	10	10	10	10	10	15
10	15	15	15	15	15	15	20
5	20	20	20	20	20	20	25
0	25	25	25	25	25	25	35

Micronutrients: Pulse crops require a supply of all the essential micronutrients namely boron (B), chlorine (Cl), copper (Cu), manganese (Mn), molybdenum (Mo) and zinc (Zn). Micronutrient deficiencies have not been observed in most pulse crops. As a result soil tests for micronutrients and micronutrient applications have not been calibrated to crop response. The only exception is dry beans under irrigation in southern Alberta. Zinc deficiency in beans is most likely to occur under the following conditions: soil pH is higher than 7.5; soil has had high phosphate fertilizer or manure applications; and there is cool damp weather in spring or early summer.

Zinc deficiencies can be prevented with a pre-plant application of banded granular zinc at a rate of 2 to 5 lb/ac. If deficiency symptoms occur after emergence, a foliar application of 0.5% zinc sulphate solution will give satisfactory results. Split the application in two, applying the half rates a week apart.

Soil analysis sometimes incorrectly predict the need for micronutrient fertilizers, particularily for B and Zn. Often

yield responses to fertilizer do not occur even though the soil tested low for B or Zn. Further research is required to identify micronutrient deficiencies and improve soil tests and fertilizer recommendations.

If you want more information on micronutrient deficiencies, a newly revised Agdex 531-1 is available from Alberta Agriculture's Print Media Branch. If you suspect a micronutrient deficiency in your fields, we suggest a soil test followed by consultation with your DA or regional soil specialist, or other qualified extension professionals before proceeding with fertilizer applications. A good approach is to try a test strip across the field. This will give you a chance to evaluate the results before fully committing to a micronutrient fertilizer program.

Summary

✦Proper inoculation is crucial if you want to take full advantage of pulse crop's nitrogen fixing capabilities.

✦When soils have more than 40 lb/ac of N in the top 24 inches, you will normally not get an advantage from N fertilizer. When soils contain less than this amount, a small amount of N fertilizer will generally payoff, particularly with dry beans.

✦Pulse crops often respond to P fertilizer but responses are not always predicted by soil test results. An annual maintenance application of phosphate will help maintain adequate phosphorus levels.

✦Potassium and sulphur are not usually limiting factors in pulse crop production. On soils testing low in K and S, following the fertilizer recommendations in Tables 1 and 2 will generally provide adequate nutrition.

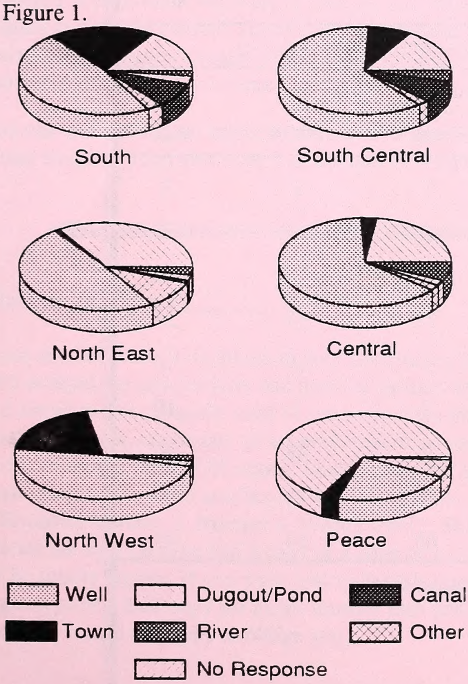
✦Micronutrient fertilizers are rarely required in pulse crop production with the exception of dry beans.❐

THE EFFECT OF WATER QUALITY ON PESTICIDE EFFICACY

Denise Maurice
Crop Protection Branch

Although water is an important component of spray operations, little attention is given to water quality as it affects pesticide performance. For most applicators, quality water simply means water clear enough so that nozzles are not plugged with sediment during spraying. While this physical aspect is an important consideration, chemical aspects of water quality also vary with water source and can profoundly affect the success of sprayer operations. Interestingly, results of the Crop Protection Survey indicate that the water used for spraying comes from many different sources (Figure 1).

Figure 1.



Water source dictates the quality factors that will be of particular concern. For example, if the primary water source is a dugout, as is the case in the Peace River Region, the important factors are the levels of sediment, soluble organics, and minerals (the latter is sometimes referred to as dissolved solids). If well water is the source, then dissolved solids are the primary concern.

Another chemical attribute that must be taken into account, regardless of water source, is pH. The pH of the water supply influences the length of time after mixing that a pesticide will remain active and thus effective. Pesticide performance is optimum when the pH of the water is acidic (pH < 7). In many areas of the prairies, the water supply is naturally alkaline (pH > 7). Water with a pH value of more than 7.5 is alkaline enough to affect the stability of organophosphate and carbonate insecticides. The rate of breakdown accelerates as the pH increases and is accelerated further as temperature increases (Table 1).

Herbicide solubility can also be affected by high pH water. For example, at pH's greater than 3.8, the wild oat herbicide Assert precipitates to form a "cottage cheese" like substance in the bottom of the spray tank. Precipitation reduces herbicide activity in the solution and the precipitate can clog lines and sprayer nozzles. To overcome this problem, Assert is now sold with an acidulate which lowers the pH and optimizes herbicide performance.

Measuring water pH is a simple procedure that can be performed by a soil test lab. There are also a number of

Continued Page 7

THE CADILLAC OF FERTILIZERS

Ross H. McKenzie
Soil Fertility Specialist

Over the past winter I have had numerous inquiries about manure. With spring rapidly approaching, I thought it might be an appropriate time to answer a few of the more frequently asked questions.

◆How much nitrogen (N), phosphate (P_2O_5) and potash (K_2O) are in different manures?

The composition of manures varies widely. Differences are due to the type of animal, the type of feed, and the conditions under which the manure is collected and stored. The quality of bedding materials contained in the manure also affects the composition. Table 1 gives average values but considerable deviation will occur. The best way to determine nutrient levels in your manure is to send samples to a soil testing laboratory.

◆How does the storage and handling of manure affect the final nutrient content?

Nutrients can be lost during storage and handling. Nitrogen in the urea form can be lost through hydroloysis leading to the formation of volatile ammonia (NH_3) gas. Storage in loosely stacked well aerated piles encourages microbial activity, which in turn causes the pile to heat and dry rapidly. Heating and drying hasten the loss of NH_3. You can reduce volatilzation losses by keeping your manure compacted during storage and handling. This helps reduce heating and drying. Compaction forces the air out of manure, which promotes anaerobic (airless) decomposition. The organic acids produced during anaerobic decomposition reduce the pH of the manure. At low pH, NH_3 converts to non-volatile ammonium (NH_4^+).

You can also lose nurtients from your manure piles through leaching. Soluble nutrient forms such as nitrate (NO_3^-), potassium ion (K^+) or boron as boric acid (H_3BO_3) can move with water through the pile and out the bottom. Fortunately, phosphorus and most micronutrient elements are retained in relatively immobile forms which are not subject to leaching.

You can reduce losses through volatilization and leaching by storing solid and liquid wastes together with water in tanks, pits or lagoons. However, much of the P settles out with the sludge and is lost if only the liquid is applied to the land.

◆How does application method affect the final nutrient content?

Nutrient losses during application are primarily through NH_3 volatilization (Table 2). To prevent these losses you need to get the manure underground as quickly as possible. For the best results, you should incorporate immediately following broadcast application or use an applicator which injects slurry or liquid manure directly into the soil.

Conditions at the time of application can also have an effect. Volatilization losses from broadcast manure will be highest under hot dry windy conditions and lowest under cool humid calm conditions. Thus, with summer applications you must

Table 1. Approximate nutrient content of animal manures

Type of Manure	Waste Handling System	Dry Matter (%)	Nutrient (lb/ton raw waste): Nitrogen Available*	Nitrogen Total**	P2O5	K2O
Swine	Without bedding	18	6	10	9	8
	With bedding	18	5	8	7	7
Beef cattle	Without bedding	15	4	11	7	10
	With bedding	50	8	21	18	26
Dairy cattle	Without bedding	18	4	9	4	10
	With bedding	21	5	9	4	10
Poultry	Without litter	45	26	33	48	34
	With litter	75	36	56	45	34
	Deep pit (compost)	76	44	68	64	45

* Primarily ammonium N, which is available to the plant during the growing season.

** Ammonium N plus slow releasing organic N.

Source: Sutton et al., Purdue Univ. 1D-101 (1975)

incorporate immediately to prevent losses. Applications during cool spring and fall weather will generally result in less volatilization loss than summer. Winter application is not recommended. Not only is there a high potential for nitrogen volatiliztion losses, but you may also lose nutrients with runoff in the spring.

◆What is the commerical value of manure?

From Table 1, under beef cattle with bedding, if we assume that N is worth $0.25/lb, phosphate is $0.25/lb, and potash is $0.15/lb, a ton of manure would be worth about $13.65 on a wet basis. Keep in mind that all the nutrients are not plant available in the first year. You also need to consider the hauling and application costs when calculating the value of manure. (For more information see Agdex 538-2, available from Print Media Branch, Alberta Agriculture.)

Table 2. Method of application and N volatilization.

Method of Application	Type of Waste	Nitrogen Loss*(%)
Broadcast without cultivation	Solid	21
	Liquid	27
Broadcast with cultivation**	Solid	5
	Liquid	5
Knifing	Liquid	5
Irrigation	Liquid	30

*Percent of total N in waste applied which was lost within 4days after application.

**Cultivation immediately after application.

Source: Sutton et al., Purdue Univ., 1D-101 (1975).

◆How do I know how much manure is being applied per acre?

Feedlot manure weighs between 30 to 40 lb/cubic foot, depending on amount of bedding and moisture content. Therefore, by calculating the capacity of your manure spreader, the number of loads spread and the number of acres fertilized, a reasonable estimate of tons per acre of appplied manure can be determined. Analysis of the manure for nutrient and moisture content would make the estimate of nutrient application much more accurate.

You can estimate liquid application rates in a similar manner. Water weighs 65 lb/cubic foot. Liquid manure would weigh somewhat more than this depending on concentration.

◆How quickly does manure break down to release plant available nutrients?

The rule of thumb is that 50% of the N and P will be available during the first year. Half of the remainder (25%) will become available in the second year and half of the remainder (12%) in the third year etc. When manure has been applied for a number of years to the same field, you can expect nutritional benefits to last 3-4 years after the last application. The residual effects on soil tilth may persist for several decades.

◆Why is manure sometimes better than commerical inorganic fertilizers?

Manure is nature's original slow release fertilizer. Nutrients in organic form are changed to plant available forms slowly over the growing season. Manure increases the water holding capacity of the soil. It also helps to bind soil particles together improving soil structure. Good soil structure helps reduce soil erosion potential and soil crusting problems. Thus, there are a number of soil quality benefits at no extra charge when you fertilize with manure.

These are just a few of the many questions often asked about manure. One question not addressed here was rates of application. For specific information in your area and for your crops, contact your district agriculturist, or regional soil or crop specialist. Happy hauling this spring. ☆

Please feel free...........

to use articles from SOILutions in your own publications. We have noticed our articles here and there in various newsletters and circulars and certainly want to encourage this trend. We would, however, appreciate an acknowledgement when you do lift an article from SOILutions. Please quote the specific issue that contained the article (e.g. Reprinted from SOILutions Volume 2, Number 4, Winter 1991) . SOILutions articles are in 10 pt type and a copy of a copy of a copy may not be totally legible. If you want a more legible copy in larger type or a disk copy for direct transfer into your document, we would be happy to oblige you.

Eds.

SOILutions is published quarterly by Soils Branch, Alberta Agriculture. Your comments on current contents, ideas and contributions for future articles are welcome. For further information phone, fax, or write *Dan Heaney*, Soil and Animal Nutrition Laboratory, 905 O.S. Longman Bldg., 6909-116 st, Edmonton, Alberta, T6H 4P2, Phone (403)427-6361, Fax (403) 427-1439 **OR** *Elston Solberg*, Soils Branch, J.G. O'Donoghue Bldg., 7000-113 st, Edmonton, Alberta, T6H 5T6. Phone (403) 427-2530, Fax (403) 422-9745.

Compaction cont.

With solonetzic soils the answer is cut and dried. The hard pan definitely restricts root growth and limits crop growth. Our understanding of the situation in fields of other soil types however is speculative. Speculation puts luvisols rather high on the list for potential compaction.

Without a doubt the heavy traffic of tractors, combines, loaded trucks and fertilizer applicators all compact soils, particularly when the soils are wet. The shearing action of cultivation and spinning tires further contributes to compaction. In Luvisols these farm factors can increase the compactness of a B horizon with a naturally high bulk density due to clay accumulation.

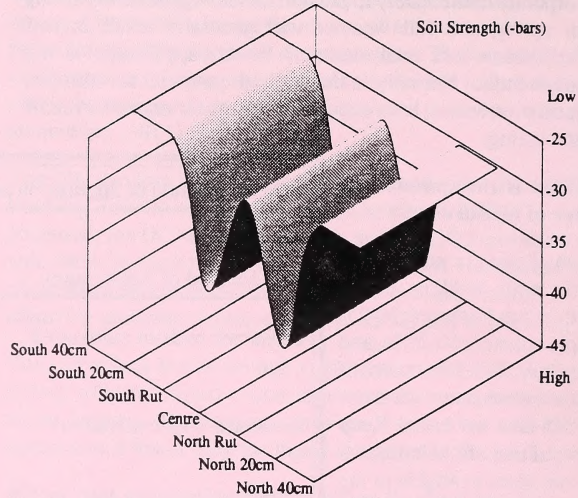
Why doesn't every field that has been farmed for 50 years display the effect of soil compaction? One school of thought holds that processes such as cultivation, freeze-thaw, and wetting-drying counteract subsoil compaction caused by field traffic. This runs contrary to observations from ancient roadbeds where soils are known to remain compacted for up to 2000 years. Why should agricultural soils be any different? An evaluation of the old Plains-Carlton freight trail shows that the compacted wagon tracks have retained significantly greater soil strength (50%) than the undisturbed native range, 80 years after the passage of the last wagon (Figure 1). If natural loosening processes are at work, obviously these processes are extremely slow.

If compaction due to field traffic progresses at a greater rate than loosening, we would expect subsoil compaction effects to accumulate over time. Studies at four sites comparing soil strengths on new breaking and adjacent old cultivation (50-70 years) show this to be true (Table 1). Soil strength on the new breaking was only 50-75% that on the old field. At the same time, crop yields have been satisfactory on the first three sites indicating that critical compaction levels have not been reached. However, the Verbitsky site did show crop stress when not alternately fallowed. This may indicate near critical levels of subsoil compaction.

How do you tell if your subsoil is compacted? Unfortunately, there is little information available which could be used to evaluate field situations and determine if or what remedial action should be taken with respect to soil compaction. Deep ripping trials on Gray Luvisolic sites showed extremely variable yield responses, but some differences between annuals and perennials were apparent (Figure 2). For annual crops, nearly 65% of the site years showed positive yield responses. Only 40% showed positive yield responses for perennial crops. This data suggests that ripping has merit for annually cropped Luvisols but is of questionable value for perennial forage land. The question of which fields should be ripped cannot yet be answered nor can the economics be fully evaluated since the duration of the benefit is unknown.

Subsoil compaction does not appear to be a problem that will go away by itself. In fact, it seems to be a slow and inevitably growing problem that we often don't recognize even when we do see it. With all the uncertainty surrounding compaction, future investigations should prove enlightening for producers and scientists alike.✪

Figure 1. Soil Compaction on the Plains-Carlton Trail



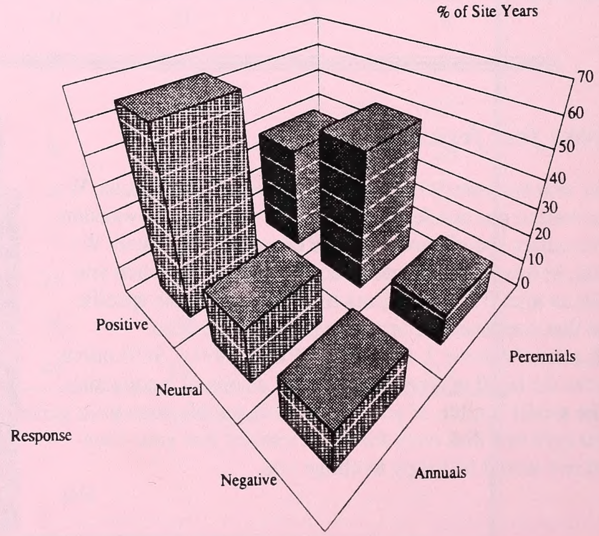
Maximum reading in the 0-30 cm depth using

Table 1. Changes in soil strength induced by farming.

Field	Soil Strength *(bars) New break	Old break
Stanislaw 1	7.2	18.5
Stanislaw 2	8.1	16.6
Stanislaw 3	9.2	21.2
Verbitsky	31.4	41.1

* Data are means of maximum cone penetrometer readings in the 0-40 cm depth.

Figure 2. Yield response to deep ripping of Luvisols.



Water cont.

inexpensive kits available that allow rapid determination of pH in the field but they tend to be less accurate than laboratory analysis. Once pH is determined, corrective measures can be taken if required. A number of commercially available acidifying and buffering agents can be used to alter pH and minimize water impact on pesticide performance.

The presence of dissolved solids in the water supply can also reduce herbicide performance. Hard water in particular reduces herbicide performance. The term hard water refers to the types of minerals in solution rather than the amount. So high mineral content does not automatically mean hard water. Hard water contains excessive calcium and magnesium, while soft water can contain high levels of sodium. Generally, water in Alberta is calcium and magnesium rich regardless of source. Research work done at the University of Saskatchewan by Rick Holm shows that the performance of POAST (sethoxydim), ROUNDUP (glyphosate) and 2,4-D amine is reduced depending on the degree of mineralization of the water supply. The activity of POAST is lessened when mixed with water containing moderate to high levels of bicarbonate. ROUNDUP performance is reduced in water containing calcium, magnesium, iron and possibly sodium and chloride. The effect of these minerals on ROUNDUP performance is more pronounced at application rates below 1L/ac (product). 2,4-D amine is antagonized by water containing high concentrations of calcium, magnesium, sodium chloride or bicarbonates. Holm found that application rates for 2,4-D amine had to be increased from 340 to 450 mL/ac when mixed with well water containing high levels of dissolved solids.

The influence of water quality on herbicide performance is complex and can be compounded by environmental conditions, growth stage, and application rate. As a result, our understanding of the interaction between water quality and herbicide performance is still relatively sketchy. More research needs to be done before comprehensive guidelines can be developed.

In the absence of specific guidelines to follow, what can you do to counteract the effects of poor quality water? You should use the best quality water you can access and adopt a strategy aimed at optimizing all other factors that influence performance. The following tactics may help:

Table 1. Effects of water pH on common insecticides.

Trade Name	Common Name	pH	Half Life*
Sevin	Carbaryl	9	24 hours
		7	24 days
		6	100 days
Furadan	Carbofuran	9	78 hours
		7	40 days
		6	200 days
Guthion	Azinphos methyl	9	12 hours
		7	10 days
		6	17 days

* Time required for 50% reduction in herbicide activity.

☆ Send a water sample to the District Agriculturist for a chemical water analysis. Sample during the month prior to spraying. Taking a sample earlier, especially in the case of dugouts may give a misleading reading.

☆ If chemical characteristics such as pH, hardness, and total dissolved solids suggest your water is of poor quality, seek a more suitable water source if this is a practical alternative.

☆ Use the minimum amount of water per acre which will still provide good coverage and maintain adequate crop safety. Use 110 degree nozzles at 18 inch spacing for best coverage.

☆ Use the maximum recommended herbicide rate.

☆ Use the appropriate adjuvants as recommended on product labels.

☆ Apply products as close to the optimum time as possible and avoid spraying during adverse weather conditions which may further reduce the efficacy of the product.

☆ Use the ester rather than the amine formulation of 2,4-D wherever possible.❑

Come in out of the cold!!

The 2nd International Symposium on Agricultural Techniques in Cold Regions (ISACII) will be held August 4-7, 1992 at the University of Alberta, Edmonton, Alberta, Canada. ISACII will focus on the limits placed on soil, plant and animal productivity by low temperatures and/or short growing seasons. All aspects (economic, production, technical, etc.) of water erosion, subsoiling and soil compaction, forages, animal metabolism, and animal housing and environment will be discussed.

Sessions will facilitate the transfer of technical and scientific information among scientists, extension personnel, and producers. A technical tour following the sessions will focus on field observations of activities related to cold climates.

For more information, contact D.S. Chanasyk, Department of Soil Science, Rm. 4-42 Earth Sciences Building, University of Alberta, Edmonton, Alberta, T6G 2E3, telephone 403-492-3242 or FAX: 403-492-1767.☆

SOIL SEARCHING

Agriculture and Food - Educating the Public

The importance of providing the public with factual information about agriculture and food issues cannot be over stated. Within the agricultural community, the media is often blamed for not providing a balanced and knowledgeable perspective on the issues. Certainly much of the criticism of the media is justified, but is our own house in order? I have a large collection of quotes from agrologists and farmers that fall into the category of sensationalism and misinformation. You would expect that most of these statements are over zealous defenses of some current practices, but in fact many are over zealous and unfounded condemnations of current practices. Rather than contributing to public education on agricultural and food issues, many of these statements have contributed to a poorly informed public.

First, we should all recognize that there are important agricultural and food issues that need to be addressed. Why are some agrologists and farmers so eager to overstate or mis-state the issues? One obvious answer is to obtain money for research and farm programs. Agriculture is not alone in this game. Peter Leavitt, a meteorologist with the Western Services Corp. Bedford, Mass. recently stated that "Global warming and the greenhouse effect have received inordinate publicity from the media. Most of the money for atmospheric research comes from the federal government, and while the majority of scientists have strong reservations about what may be exaggerated predictions, some scientists are willing to entertain these ideas if it means having their research funded. It's survival of the scientist."

It is painfully obvious that there is an urgent need to educate the public with factual and balanced information about agricultural and food issues. It is also clear that the efforts of some agrologists and farmers to get support for research and farm programs in conjunction with the sensationalism of environmental activists makes the task of educating the public very difficult.

In the June-91 issue of AgriScience, Freeman McEwen, President elect of the Agricultural Institute of Canada (AIC), defined the role of the agrologist in an article entitled "The Agrologist in a Changing World." His discussion was presented under the following headings - Knowledgeable, Honesty, Objectivity, Serve Society, and Information. He also identified two roles the agrologist should not play: that of an "activist" in the context that word now implies and that of an "apologist " defending bad farming practice. Dr. Freeman used David Suzuki as an example of an activist "whose knowledge of the subject is dwarfed by his need to generate headlines. The result is a public poorly informed and because of this, vulnerable to sensationalism, half-truths and downright misinformation."

AIC has been discussing its role in providing a national focus for credible public education on agriculture and food systems. This important role has not received adequate attention. In developing this role, AIC needs to review the record of its membership. If in fact there is no role for the agrologist as an "activist", then there are numerous examples of statements by AIC members that do not meet the criteria of credible public education. The differences between a credible public educator and an "activist" obviously need to be clearly defined.

The difficulty of providing credible public education through the media was illustrated in Edmonton Journal and Western Producer articles covering the recent Alberta Conservation Tillage Society meeting in Edmonton. The titles of the articles reporting an address by Dr. Fred Bentley, former Dean of Agriculture, University of Alberta and member of the Canadian Conservation Hall of Fame, were "Subsidies Kill the Soil", and "Subsidies Hasten Damage to Soil." Some of the statements in these articles attributed to Dr. Bentley included:

"Our monoculture production has contributed to a considerable reduction in soil organic matter."

"In fact, subsidies allow struggling farmers to continue using outdated farm practices and to grow environmentally unfriendly crops like hard red spring wheat."

"Canada's soil problems are due in part to government programs that emphasize grain production - the most soil degrading type of farming today."

"Continual grain harvesting needlessly robs the soil of nitrogen......"

"The Alberta government has contributed tens of millions of dollars in nitrogen subsidies."

These statements, in the context of the articles, suggest to the public that Western Canadian grain production and its use of nitrogen fertilizers is soil degrading and environmentally unfriendly. An idea which is not supported by the current scientific evidence. There are several recent scientific papers which clearly show that of the annual cultivated crops, cereals are among the best for maintaining soil organic matter. It is the fallow and not the cereal component of cereal-fallow rotations that is of concern. Studies have also shown that the use of nitrogen fertilizers in cereal crop production have helped to increase or maintain soil organic matter and productivity. This example is representative of what seems to be a continuous inability to provide the public with a clear and balanced interpretation of relevant scientific knowledge.

I agree with Freeman Mc Ewen: "there is no role for the agrologist as an activist", but in a media dominated by activism and sensationalism, the task of providing credible public education on agriculture and food issues is enormous.

Douglas C. Penney, P.Ag.